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AWARENESS ABOUT THE RELATIONSHIP BETWEEN CONSANGUINEOUS MARRIAGES AND THALASSEMIA AMONG THE EDUCATED AND UNEDUCATED POPULATION OF RAWALPINDI / ISLAMABAD

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Abstract:

Objective: *To assess the awareness about the relationship between consanguineous marriages and thalassemia among the education and uneducated population of Rawalpindi / Islamabad*

Study Design: *Comparative Cross-Sectional Survey*

Place and Duration: *Data was taken different areas of Rawalpindi and Islamabad, Pakistan from June 2015 to August 2015.*

Material and Methods: *Survey was conducted by a group of 4th year MBBS students by randomly going to people in public places in the city of Rawalpindi and Islamabad from June to August 2015 to find out the awareness about the relationship between consanguineous marriages among the educated among the uneducated population of the cities. A closed-ended questionnaire was used. Analysis of the data was done with SPSS 22.0 for Windows.*

Results: *Results of our study showed that the participants having education are more aware about the problem than uneducated participants. In educated people it is 62.4% were aware about the issue as compared to 17.4% of the uneducated participants. The participants were also questioned regarding their knowledge about thalassemia and in this 73.4% of educated people have knowledge about thalassemia as compared to 26% of the uneducated participants.*

Conclusion: *Consanguineous marriages in successive generations leads to genetic diseases like thalassemia is a much ignored problem being faced by the people of Pakistan. Purpose of this study was to analyze the awareness among the educated and uneducated population of Rawalpindi/Islamabad regarding the relationship between consanguinity and thalassemia. We have concluded that educated people have more knowledge about this issue than the uneducated people. This research cannot be generalized to the whole population of Pakistan hence more such researches should be conducted in other areas with the backing of the Govt. of Pakistan.*

Keywords: *Awareness, consanguineous marriages, thalassemia*

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INTRODUCTION:

Thalassemia is a heterogeneous group of hereditary disorders in which there is impaired production of one or more globin polypeptide chains leading to ineffective erythropoiesis and anemia. The two major types of thalassemia Alpha and Beta thalassemia are named after the defects in Alpha and Beta globin chain synthesis respectively. Four genes (two from both parents) are required for synthesis of Alpha chains. Alpha thalassemia trait occurs when one or two of the four necessary genes are missing leading to moderate to severe anemia. The most severe form is alpha thalassemia major. The babies which have alpha thalassemia die before or shortly after birth.
Two genes (one from each parent) is required for synthesis of beta globin chain. If one or both genes are altered the individual suffers from beta thalassemia. The severity of the disease depends upon the extent to which one or both the genes are affected. The affects range from severe anemia to clinically asymptomatic individuals. The most severe form is known as thalassemia major.

Signs and symptoms may range from asymptomatic/no symptoms in thalassemia minor/trait cases to severe microcytic, hypochromic anemia. Untreated, it causes anemia, splenomegaly and severe bone deformities which unfortunately lead to death before the age of 20 years in most cases.

The treatment involves periodic blood transfusions and iron chelation therapy. Bone marrow transplantation and hematopoietic stem cell transplantation (latest technique) are the only curative measures but due to the costly nature of the procedures they cannot be afforded by a majority of patients.

Thalassemia is one of the common hereditary disorders in Pakistan. An estimated 5000 plus children are born with thalassemia major in Pakistan every year although no documentary registry can be found. There are 10million carriers of the disease in Pakistan which account for approximately 5% of the total population. The cultural and social scenario in Pakistan is that consanguineous marriages are very common and there is no concept of pre-marital counseling or screening for history of any diseases running in family. Moreover, prenatal screening and other diagnostic procedures are also not easily available.

The best, cost effective and efficient way of controlling the growing statistics of mortality and morbidity by this disease is educating the people about thalassemia and making them aware of the danger it poses to them and their children. For this purpose we conducted the present study was conducted (Awareness about the relation between consanguineous marriages and thalassemia among the literate amid the illiterate population of Rawalpindi/Islamabad).

OBJECTIVE:

To assess the awareness about the relationship between consanguineous marriages and thalassemia among the education and uneducated population of Rawalpindi / Islamabad

LITERATURE REVIEW

According to a research conducted in Iran titled "Thalassemia major and consanguinity in Shiraz city, Iran" by Ali Akbar ASADI-POOYA and Mehrnoosh DOROUDCHI it was suggested that Beta-thalassemia is among the most common genetic disorders in the world and in Iran, with widespread occurrence. All interviewed patients had thalassemia major and their age, sex, and the consanguinity between parents were recorded. 40.6% of beta-thalassemia patients were outcomes of first-cousin marriages. Comparison of the percentages of familial marriages (consanguinity) between parents of beta-thalassemia patients and a sample of normal population, revealed a statistically significant difference ($p< 0.00001$). A non-statistically significant difference was observed between male (53.5%) and female (46.5%) thalassemia patients. This sex-ratio difference in thalassemic patients (males more affected than females) is noteworthy and deserves further investigation considering thalassemia as a single-gene disease transmitted by a recessive mode of inheritance. (Asadi-Pooya & Doroudchi, 2004) [1].

Another study was conducted in Saudi Arabia about "At-Risk Marriages after Compulsory Premarital Testing and Counseling for β-Thalassemia and Sickle Cell Disease in Saudi Arabia, 2005–2006" by Fahad M. Alswaidi , Ziad A. Memish, Sarah J. O'Brien, Nasser A. Al-Hamdan, Faisal M. Al-Enzy, Osamah A. Alhayani, Ali M. Al-Wadey which showed that results from a screening program for sickle cell disease and β-thalassemia suggest about 90% of couples in Saudi Arabia at risk of having affected children still decide to marry. This study determined the rate of at-risk marriages and identified several factors that may prevent at risk couples from marrying. The marriage status of 934 at-risk couples was determined from original screening program records in the Ministry of Health. Of 934 couples,

824 married (88.2%) and 110 (11.8%) did not. A case–controlled study was conducted on 104 couples who did not marry (cases) and 478 couples who did marry (controls) in order to assess relationships between various cultural and social factors and marriage decisions. In the case-controlled study, 28.8% of couples (30/104) who did not marry (cases) knew their disease or carrier status before screening compared to 18% (86/478) of those who married (controls). Reasons couples gave for proceeding with marriage included: wedding plans could not be canceled, and fear of social stigma. Couples who did not marry reported being influenced by prior knowledge of their disease or carrier status and whether they or family members were affected. It was concluded that marriage decisions for the small number who received genetic counseling (n = 168, 27.6%) did not differ significantly from those that received no counseling. Recommendations were made for improving the effectiveness of this screening program. (Alswaidi et al., 2012) [2].

"'Rakter dosh'—corrupting blood: The challenges of preventing thalassemia in Bengal, India" was conducted by Sreeparna Chattopadhyay according to which thalassemia is an inherited blood disorder that has been receiving increasing attention in India. Using West Bengal as a case study, this paper attempts to unravel some of the barriers to the prevention campaign and the consequent under utilization of the program. Lack of access, low awareness, low-risk perception and poverty were all important proximate constraints; however, one of the greatest barriers to the program was rooted in cultural notions of blood, marriage, identity, personhood and kinship in Bengali society. Using West Bengal as a case study, this paper attempts to unravel some of the barriers to the prevention campaign and the consequent under utilization of the program. Lack of access, low awareness, low-risk perception and poverty were all important proximate constraints; however, one of the greatest barriers to the program was rooted in cultural notions of blood, marriage, identity, personhood and kinship in Bengali society. The paper also suggested policies for enhancing the utilization of the program. Finally the conclusions from the study have potential applications for public health prevention programs that confront problems of stigma in program acceptability.(Chattopadhyay, 2006) [3].

A study was conducted on the topic "The thalassemia syndromes: molecular basis and prenatal diagnosis in 1990." in America by Kazazian HH Jr who outlined the molecular basis and prenatal diagnosis of alpha-thalassemia and then concentrated on the state of our knowledge of the molecular basis of beta-thalassemia and its prenatal diagnosis. He discussed the improved but more complicated genetic counselling now available as a result of our increased knowledge of the effects of various defects in the beta-globin gene. The knowledge of the heterogeneous molecular basis of the thalassemia syndromes has become very impressive and it is hoped that effective therapy will soon follow. For the present, however, prevention of the birth of affected children is the most effective means of reducing the suffering associated with the thalassemia syndromes, and prevention of this type is succeeding in many parts of the world, including North America.(Kazazian Jr, 1990) [4].

According to a study "Mutations in a putative global transcriptional regulator cause X-linked mental retardation with α-thalassemia (ATR-X syndrome)" by Richard J Gibbons, David J Picketts, Laurent Villard, Douglas R Higgs The ATR-X syndrome is an X-linked disorder comprising severe psychomotor retardation, characteristic facial features, genital abnormalities, and a-thalassemia. We have shown that ATR-X results from diverse mutations of XH2, a member of a subgroup of the helicase superfamily that includes proteins involved in a wide range of cellular functions, including DNA recombination and repair (RAD16, RAD54, and ERCC6) and regulation of transcription (SWI2/SNF2, MOTs, and brahma). The complex ATR-X phenotype suggests that XH2, when mutated, down-regulates expression of several genes, including the α-globin genes, indicating that it could be a global transcriptional regulator. In addition to its role in the ATR-X syndrome, XH2 may be a good candidate for other forms of X-linked mental retardation mapping to Xg13. ATR-X syndrome results from mutations involving XH2, a gene that lies in the region Xq13.3. A wid e variety of mutations distributed throughout the central portion of the XH2 protein give rise to a surprisingly uniform phenotype that includes severe psychomotor retardation, a similar pattern of facial dysmorphism, and a-thalassemia. (Gibbons, Picketts, Villard, & Higgs, 1995) [5].

HH Jr Kazazian and CD Boehm conducted a study on "Molecular basis and prenatal diagnosis of beta-thalassemia" according to which the molecular characterization of mutations producing beta-thalassemia in world populations is nearing completion. It is expected that new rare alleles in thoroughly studied groups and other alleles in less studied groups, eg, inhabitants of New Guinea, Latin America, and certain Pacific Islands, will be found. Knowledge of the molecular basis of the disease and new technology that allows rapid detection of single

nucleotide changes in genomic DNA have led to the reality of prenatal diagnosis by direct mutation detection even in the heterogeneous US population. Programs aimed at prevention of beta-thalassemia should be facilitated by these developments. (Kazazian & Boehm, 1988) [6].

A study conducted by Toshihiko Tanno, Natarajan V Bhanu, Patricia A Oneal, Sung-Ho Goh, Pamela Staker, Y Terry Lee, John W Moroney, Christopher H Reed, Naomi LC Luban, Rui-Hong Wang, Thomas E Eling, Richard Childs, Tomas Ganz, Susan F Leitman, Suthat Fucharoen & Jeffery L Miller is was seen that "High levels of GDF15 in thalassemia suppress expression of the iron regulatory protein hepcidin". In thalassemia, deficient globin-chain production during erythropoiesis results in anemia. Thalassemia may be further complicated by iron overload (frequently exacerbated by blood transfusion), which induces numerous endocrine diseases, hepatic cirrhosis, cardiac failure and even death4. Accumulation of iron in the absence of blood transfusions may result from inappropriate suppression of the iron-regulating peptide hepcidin by an erythropoietic mechanism. The results suggest that GDF15 overexpression arising from an expanded erythroid compartment contributes to iron overload in thalassemia syndromes by inhibiting hepcidin expression.(Tanno et al., 2007) [7].

METHODOLOGY:

Study design: This comparative cross sectional study was conducted in different areas of Rawalpindi and Islamabad after seeking approval from the Institution's Ethics Committee from June 2015 to August 2015.

Sampling technique: These individuals were selected through non-probability convenience sampling technique. The individuals were selected from both the low and high socioeconomic areas of Rawalpindi and Islamabad

Sample size: 193

Inclusion criteria: The target population included persons from all sectors of society having age 18 and above irrespective of their gender educated and uneducated individuals were included.

Exclusion criteria: Individuals unwilling to participate were excluded from the study.

Place: The study was conducted in areas of Rawalpindi/Islamabad.

Duration: Duration of study was 2 months from JUNE 2015 to AUGUST 2015.

MATERIALS & METHODS:

Survey was conducted by a group of 4th year MBBS students by randomly going to people in public places in the city of Rawalpindi and Islamabad from June to August 2015 to find out the awareness about the relationship between consanguineous marriages among the educated among the uneducated population of the cities. A closed-ended questionnaire was used.

Data analysis: Analysis of the data was done with SPSS® 22.0 for Windows.

RESULTS:

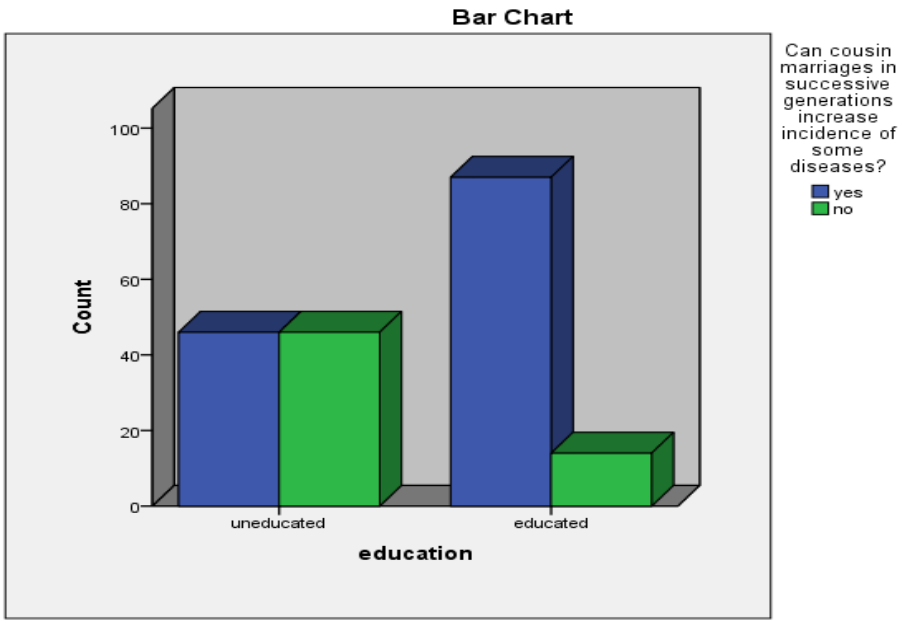
Education * Can cousin marriages in successive generations increase incidence of some diseases?

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	29.350[a]	1	.000		
Continuity Correction[b]	27.687	1	.000		
Likelihood Ratio	30.412	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	29.198	1	.000		
N of Valid Cases	193				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 28.60.

b. Computed only for a 2x2 table



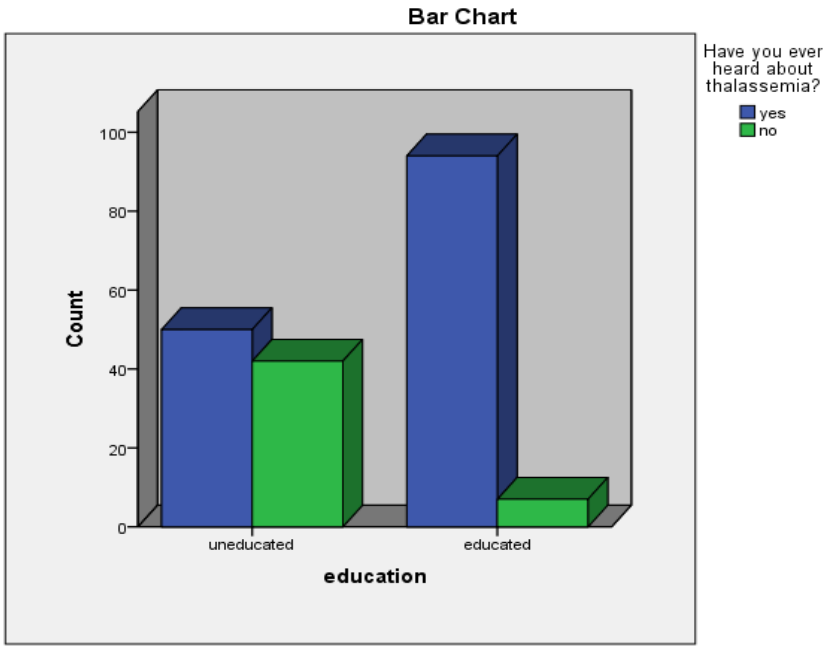
This table shows that educated people are more aware about the relationship of cousin marriages in successive generations and an increase in the incidence of some diseases as compared to uneducated people. (P. value = 0.000).

Education * Have you ever heard about thalassemia?

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	38.108[a]	1	.000		
Continuity Correction[b]	36.091	1	.000		
Likelihood Ratio	40.979	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	37.910	1	.000		
N of Valid Cases	193				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 23.36.
b. Computed only for a 2x2 table



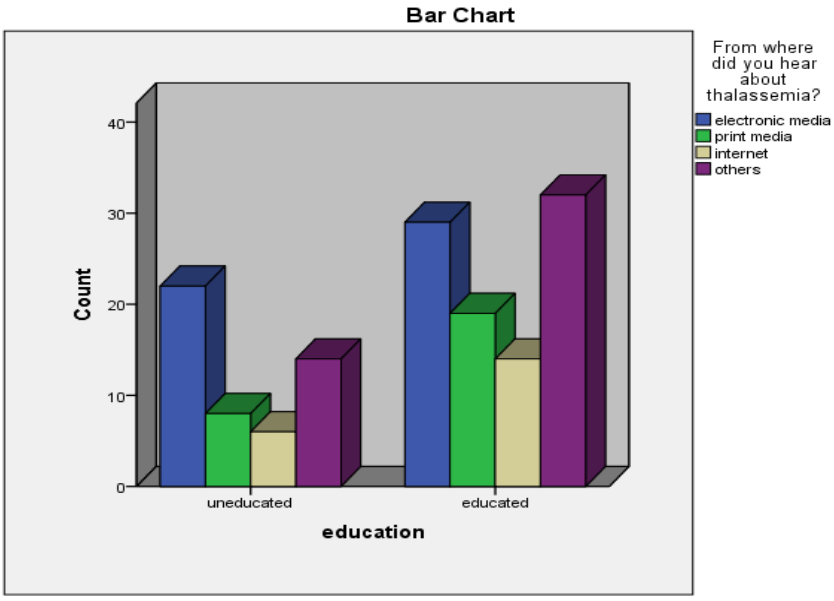
This table shows that greater number of educated people having heard about thalassemia as compared to uneducated people.(P. value = 0.000).

Education * from where did you hear about thalassemia?

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.472[a]	3	.480
Likelihood Ratio	2.443	3	.486
Linear-by-Linear Association	1.611	1	.204
N of Valid Cases	144		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 6.94.



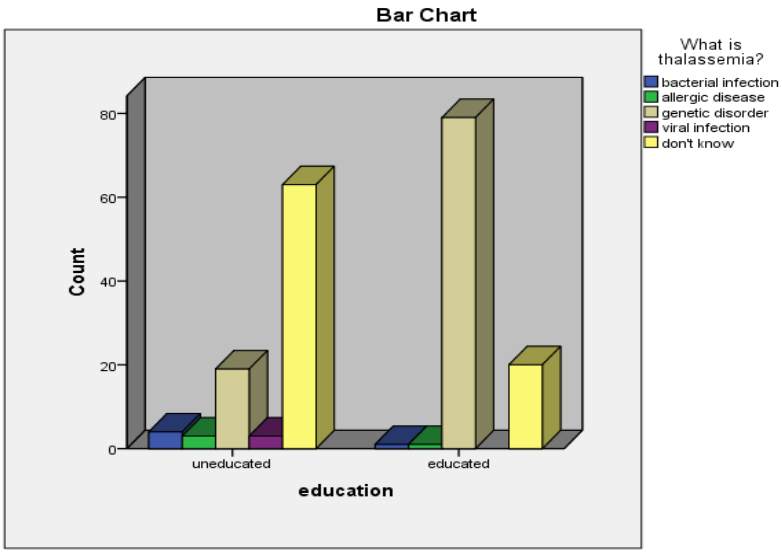
This table shows that educated people have heard about thalassemia more from print media, internet and other means than uneducated people while there is little difference in educated and uneducated people hearing about thalassemia from electronic media. (P. value = 0.448).

Education * What is thalassemia?

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	46.823[a]	3	.000
Likelihood Ratio	49.687	3	.000
Linear-by-Linear Association	29.745	1	.000
N of Valid Cases	193		

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is .48.



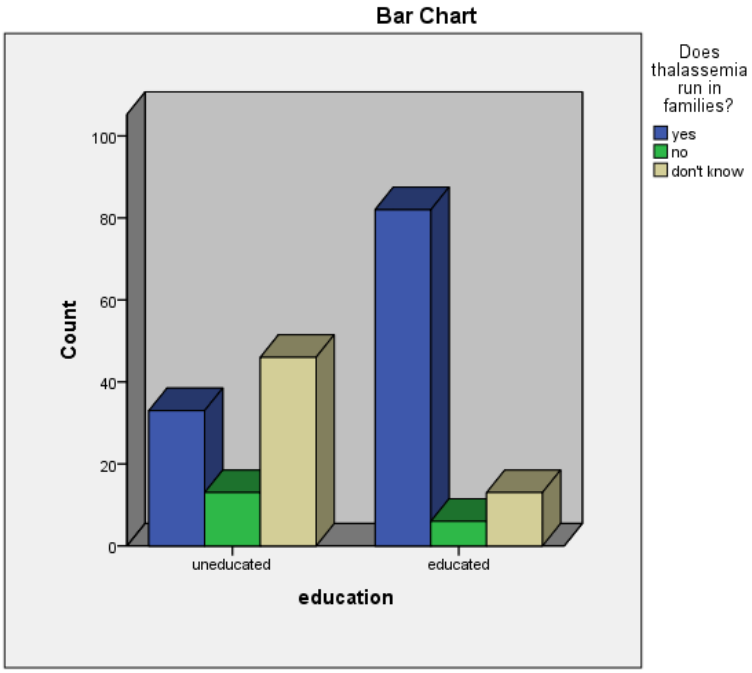
This table shows that more educated people know what thalassemia is as compared to uneducated people. (P. value = 0.000)

Education * Does thalassemia run in families?

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	41.586[a]	2	.000
Likelihood Ratio	43.347	2	.000
Linear-by-Linear Association	39.832	1	.000
N of Valid Cases	193		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.06.



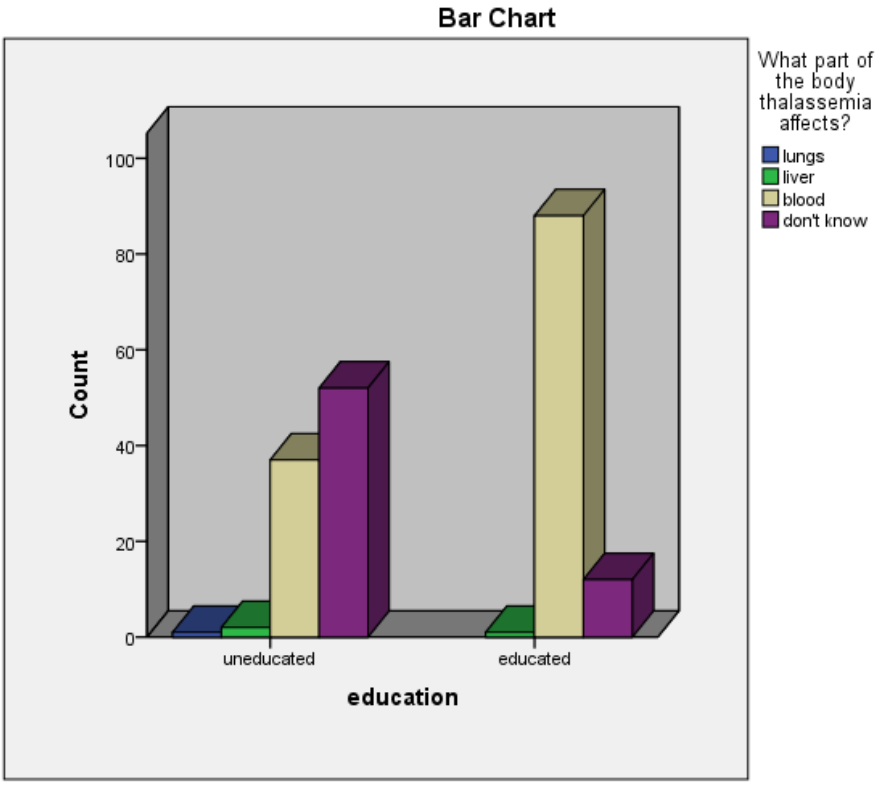
This table shows that awareness among educated people about thalassemia running in families is more than in uneducated people. (P-value = 0.000)

Education * What part of the body thalassemia affects?

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	46.823[a]	3	.000
Likelihood Ratio	49.687	3	.000
Linear-by-Linear Association	29.745	1	.000
N of Valid Cases	193		

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is .48.



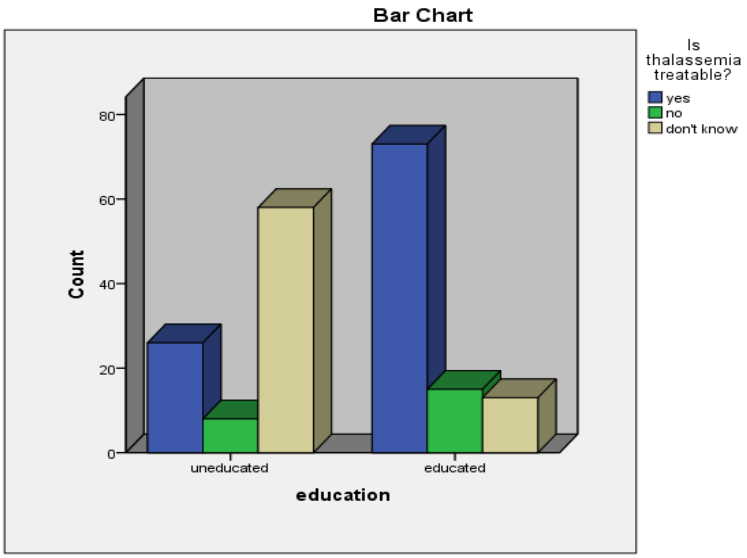
This table shows that more educated people know about the part of the body affected by thalassemia then uneducated people. (P-value = 0.000)

Education * Is thalassemia treatable?

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	52.660[a]	2	.000
Likelihood Ratio	55.809	2	.000
Linear-by-Linear Association	49.420	1	.000
N of Valid Cases	193		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 10.96.



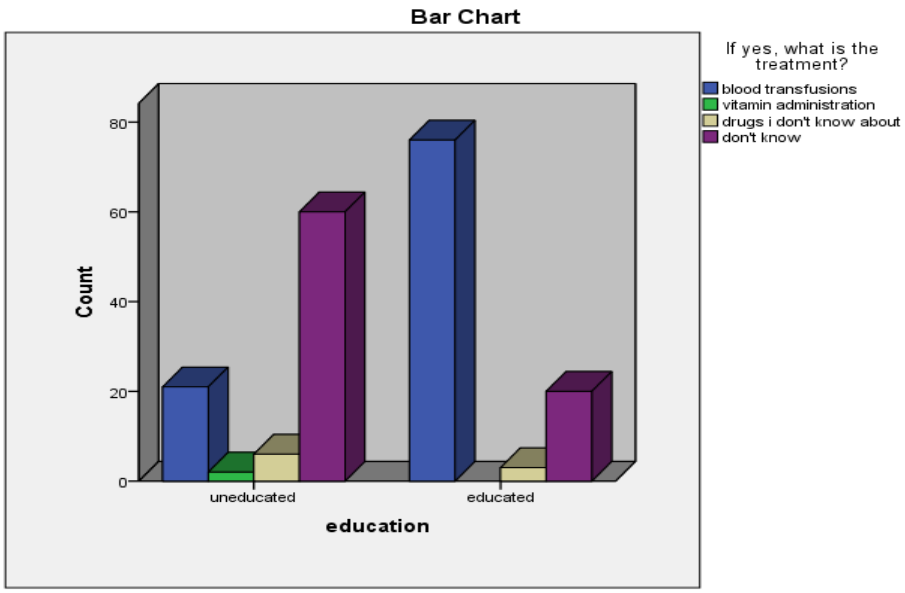
This table shows that more number of educated people are aware that thalassemia is treatable then uneducated people. (P-value = 0.000).

Education * If yes, what is the treatment?

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	53.806[a]	3	.000
Likelihood Ratio	57.308	3	.000
Linear-by-Linear Association	50.362	1	.000
N of Valid Cases	188		

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is .95.



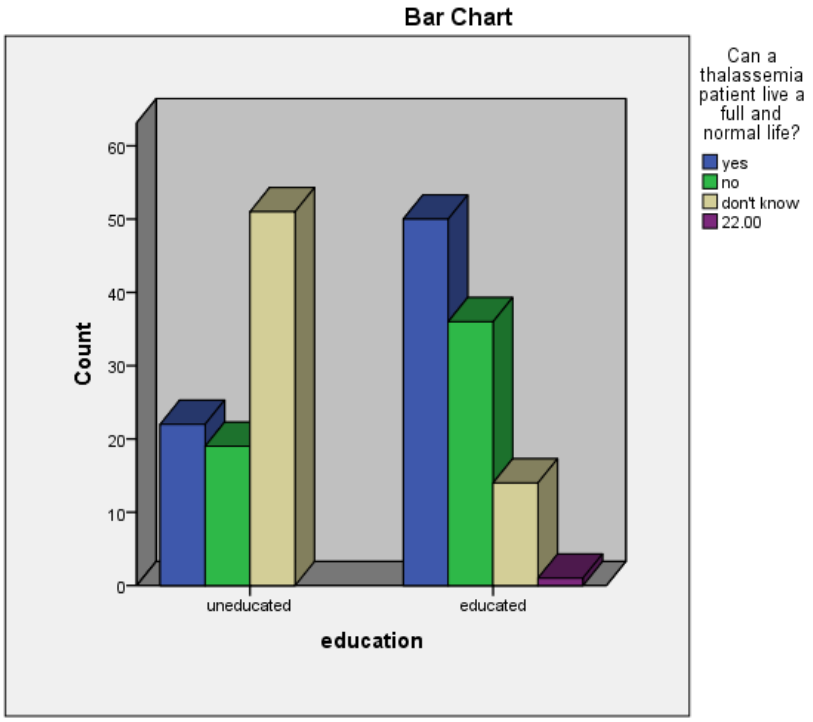
This table shows that educated people are more aware of treatment options for thalassemia than uneducated people. (P-value = 0.000)

Education * Can a thalassemia patient live a full and normal life?

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	37.868[a]	3	.000
Likelihood Ratio	39.868	3	.000
Linear-by-Linear Association	3.868	1	.049
N of Valid Cases	193		

a. 2 cells (25.0%) have expected count less than 5. The minimum expected count is .48.



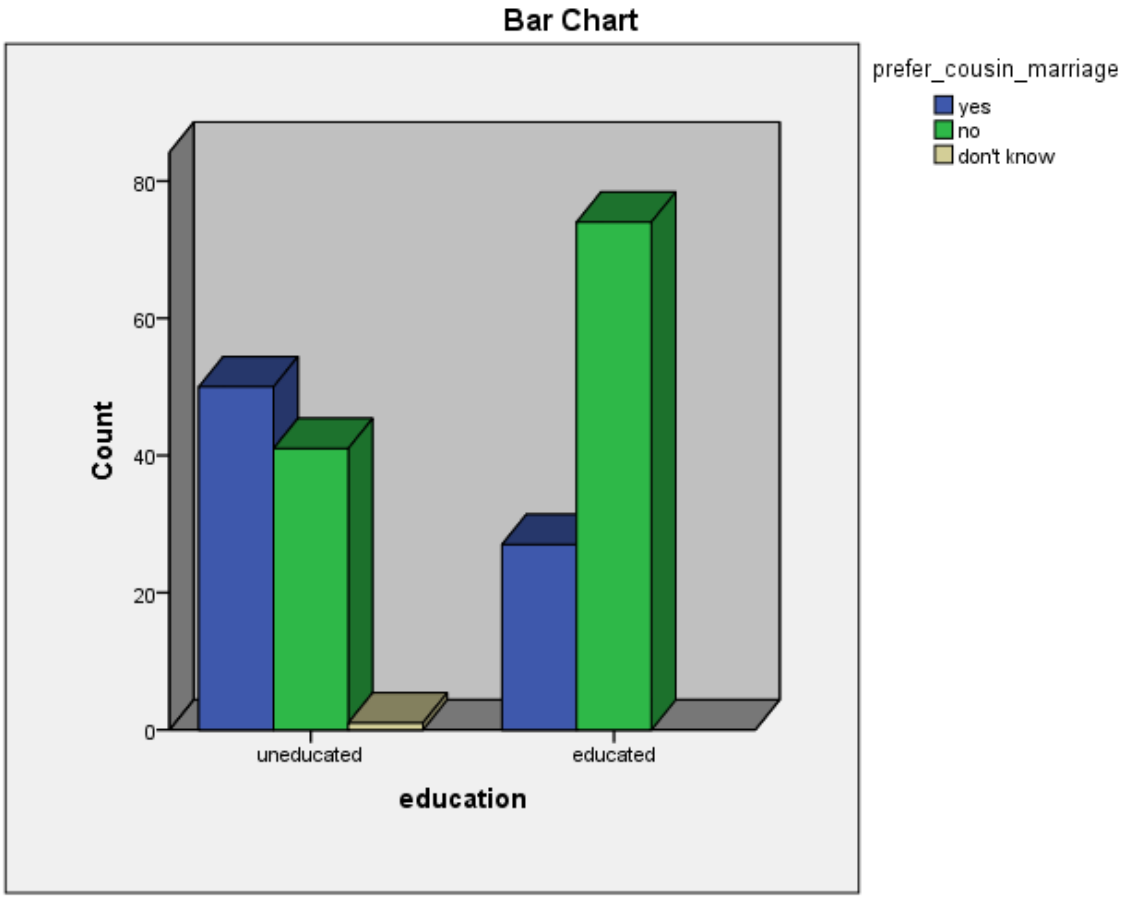
This table shows that more number of educated people are aware about the quality of life of a thalassemia patient than uneducated people. (P-value = 0.000).

Education * prefer_cousin_marriage

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	16.957[a]	2	.000
Likelihood Ratio	17.547	2	.000
Linear-by-Linear Association	13.532	1	.000
N of Valid Cases	193		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is .48.



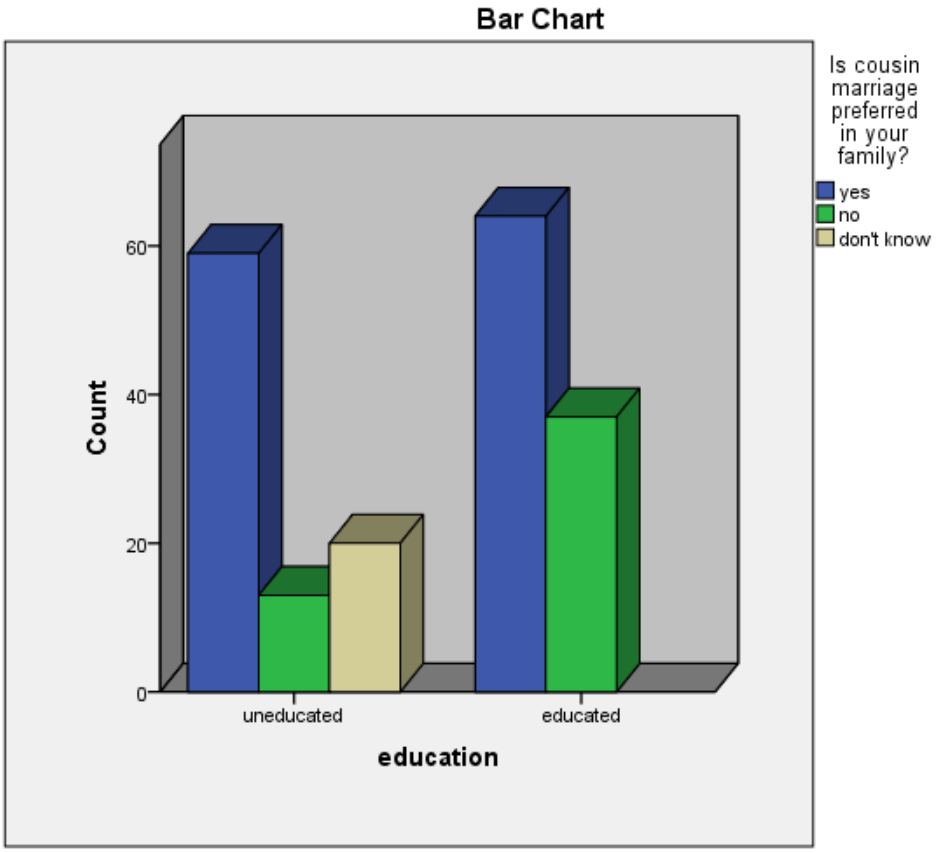
This table shows that uneducated people prefer cousin marriages more than educated people. (P-value = 0.000).

Education * Is cousin marriage preferred in your family?

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	31.372[a]	2	.000
Likelihood Ratio	39.518	2	.000
Linear-by-Linear Association	4.620	1	.032
N of Valid Cases	193		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.53.



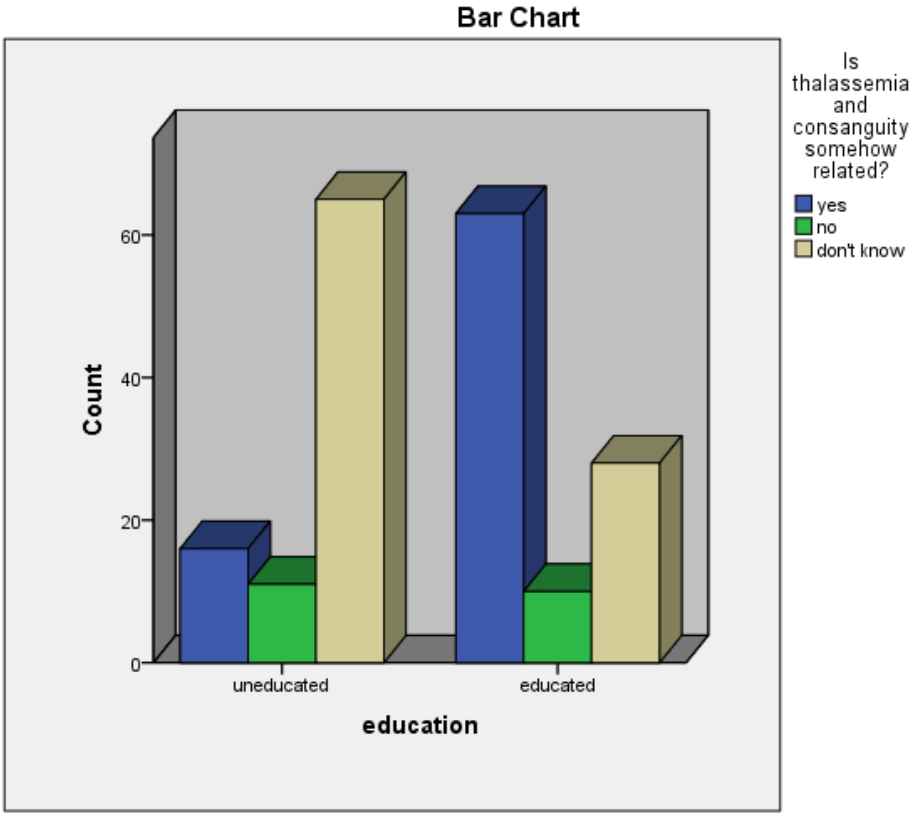
This table shows that the families of more number of educated people do not prefer cousin marriages as compared to uneducated people. (P-value = 0.000).

Education * Is thalassemia and consanguinity somehow related?

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	42.403[a]	2	.000
Likelihood Ratio	44.666	2	.000
Linear-by-Linear Association	41.785	1	.000
N of Valid Cases	193		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.01.



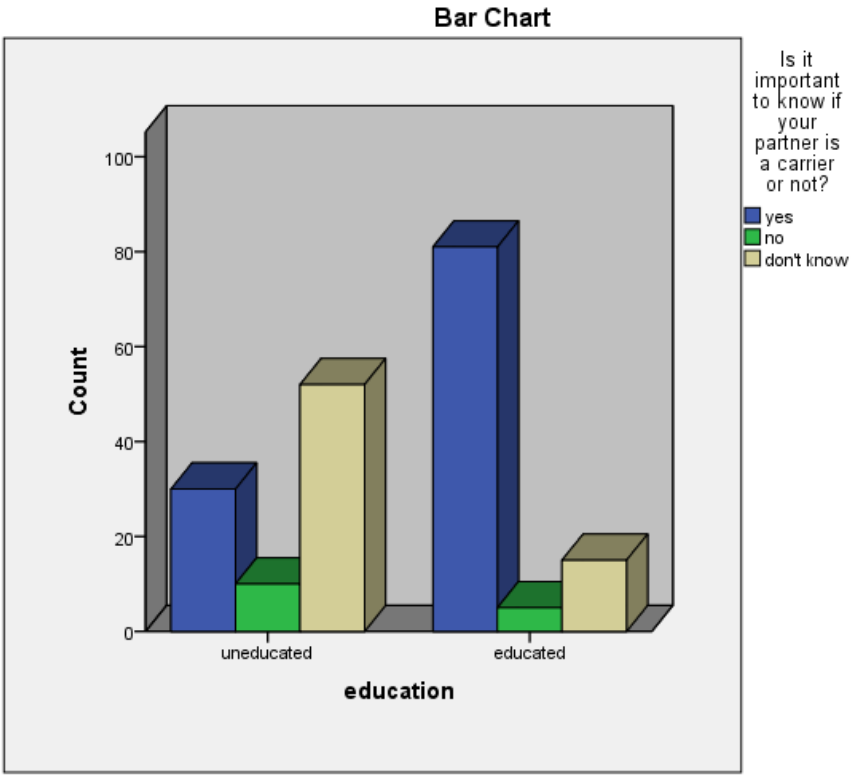
This table shows that greater number of educated people are aware of the relationship between thalassemia and consanguineous marriages than uneducated people. (P-value = 0.000).

Education * Is it important to know if your partner is a carrier or not?

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	45.211[a]	2	.000
Likelihood Ratio	47.238	2	.000
Linear-by-Linear Association	43.846	1	.000
N of Valid Cases	193		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.15.



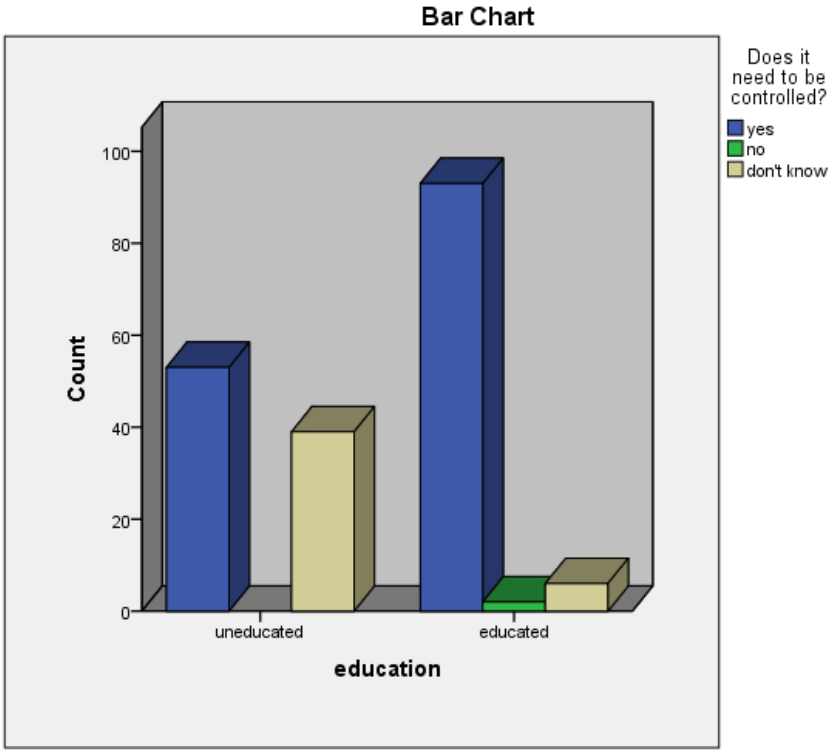
This table shows that more number of educated people think that it is important to know if their partner is a carrier or not as compared to uneducated people. (P-value = 0.000)

Education * Does it need to be controlled?

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	36.819[a]	2	.000
Likelihood Ratio	40.496	2	.000
Linear-by-Linear Association	33.657	1	.000
N of Valid Cases	193		

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is .95.



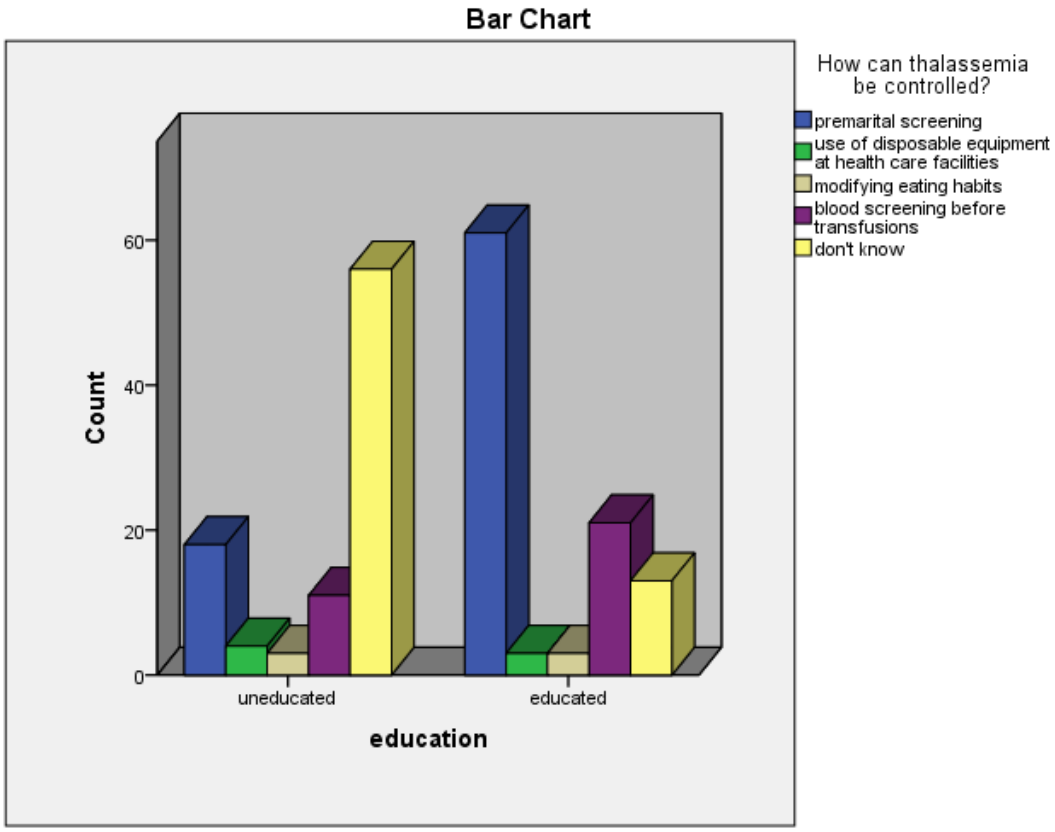
This table shows that more number of educated people are aware about the need to control thalassemia compared to uneducated people. (P-value = 0.000).

Education * How can thalassemia be controlled?

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	53.166[a]	4	.000
Likelihood Ratio	56.502	4	.000
Linear-by-Linear Association	41.083	1	.000
N of Valid Cases	193		

a. 4 cells (40.0%) have expected count less than 5. The minimum expected count is 2.86.



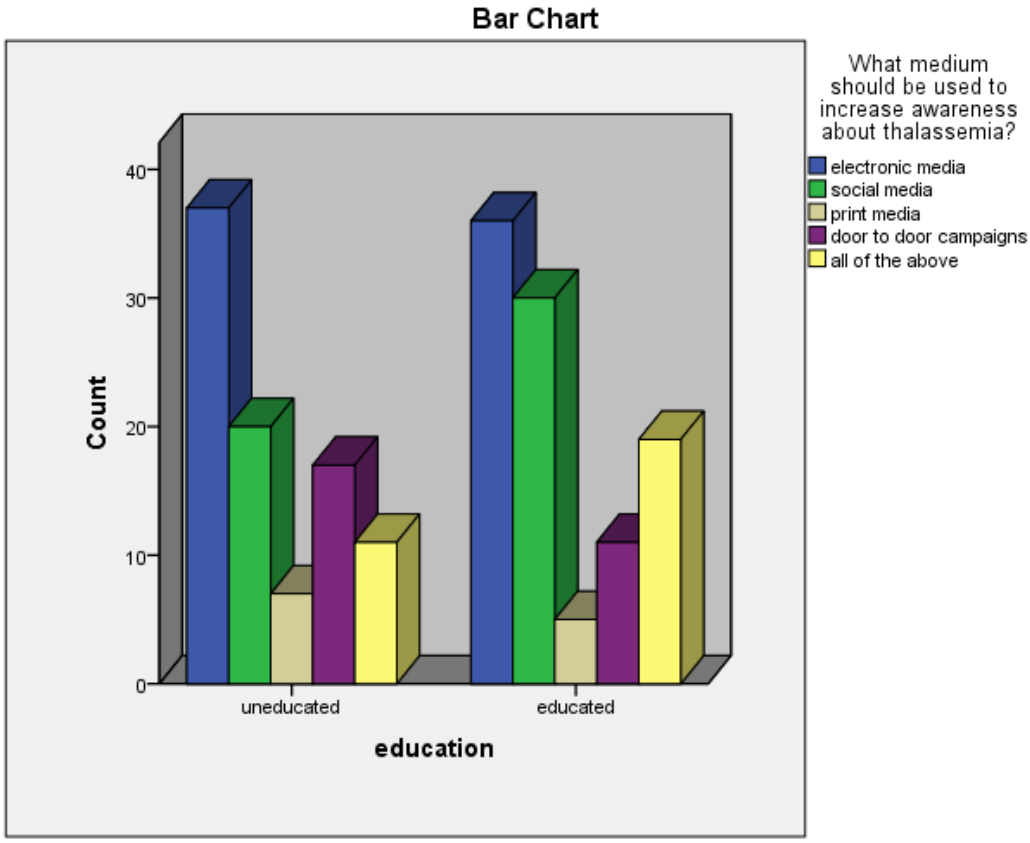
This table shows that more number of educate people think that premarital screening can control the spread of thalassemia than uneducated people. (P-value = 0.000)

Education * What medium should be used to increase awareness about thalassemia?

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.358[a]	4	.252
Likelihood Ratio	5.397	4	.249
Linear-by-Linear Association	.115	1	.735
N of Valid Cases	193		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.72.



This table shows that more number of educated people prefer social media for increasing awareness about thalassemia while there is no significant difference between the preference of electronic, print and door to door campaigns among the educated and uneducated population. (P-value = 0.000)

DISCUSSION:

Our study confirms that information lag regarding the relationship between consanguinity and thalassemia is found among both educated and uneducated population of Rawalpindi/Islamabad however comparative analysis shows that educated people are more aware as compared to the uneducated participants. It is clearly evident from the results that the participants having education are more aware about the problem than uneducated participants. In educated people it is 62.4% while in uneducated it is 17.4%. The participants were also questioned regarding their knowledge about thalassemia and in this 73.4% of educated people have knowledge about thalassemia as compared to 26% of the uneducated participants.

When questioned about the source of their information the findings showed that electronic media 35.4% was the main source. This is followed by other sources (family, friends, physicians, blood donation campaigns etc.) which stands at 32%. In regards to prevention 60% of the educated population knew that thalassemia can be prevented by premarital screening as compared to 19.5% of uneducated people. In addition to these findings it was also noted that 46.7% of the uneducated people had never heard about thalassemia as compared to 7% of the educated participants.

Very few studies have been conducted in order to determine the awareness among the population about the relationship about consanguineous marriage and thalassemia worldwide. In the same way number of studies conducted in Pakistan for this purpose is negligible. This study targets the general population about their awareness about the growing problem which is different from any other study conducted so far.

Limitations

In our research we faced certain limitations, most notable among them were that a lot more time was consumed in the filling of the questionnaire than

was initially expected. We selected a group of 200 participants for this study, among them 7 were unwilling to cooperate with us. People not showing any significant concern about the problem was also a major limitation.

CONCLUSION:

A consanguineous marriage in successive generations leads to genetic diseases like thalassemia is a much ignored problem being faced by the people of Pakistan. Purpose of this study was to analyze the awareness among the educated and uneducated population of Rawalpindi/Islamabad regarding the relationship between consanguinity and thalassemia. We have concluded that educated people have more knowledge about this issue than the uneducated people. This research cannot be generalized to the whole population of Pakistan hence more such researches should be conducted in other areas with the backing of the Govt. of Pakistan.

Recommendations:

Thalassemia is only manageable when it is prevented. Awareness campaigns must be started which should keep both the educated and uneducated population in mind so that they can be made aware of this issue. Carrier screening and premarital screening should be encouraged and specific steps must be taken by the govt. to make it possible. Genetic counselling must be provided in the far flung areas. Social and electronic media should be used to increase the awareness among the general population regarding thalassemia and its prevention. Thalassemia prevention programs must be started by the govt. as well as the NGOs.

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